

Date: Friday, 1/25/2008 10:57:20 AM
Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 407 HIGH AFT X-TUBE ASSEMBLY
 Job Number : 37011
 Estimate Number : 10528
 P.O. Number :
 This issue : 1/25/2008 S.O. No. :
 Prsht Rev. : NC Part Number : D407667205
 First Issue : 1/1 Type : LANDING GEAR Drawing Number : D407-667-245 REV D
 Previous Run : 36386 Project Number : N/A
 Material :
 Due Date : 3/10/2008 Qty: 1 Um: Each
 Written By :
 Checked & Approved By : 108 0125
 Comment : Est Rev:C 05.09.02 Add holes for compatibility with Bell
 Skid tubes KJ/JLM
 Est Rev:D Added Magnobond, Rubber Cushion & Clamps
 07-02-19 JLM
 ****CHANGE TO CHG 005 - IF USING D2894-1 B35578 OR
 GREATER****

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D407-667-205CHG004

2.0 D6011115 Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6011-115 Crosstube 34689

Check OD = 2.750"; ID = 1.450"

20-08/02/01

3.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs DT8531 on both ends as per Folio FA248

2-Turn first side as per Folio FA248

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D407-667-245.

20-08/02/01

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 1/25/2008 10:57:20 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 407 HIGH AFT X-TUBE ASSEMBLY

Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

4.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

RD 08/02/06

5.0

MORI SEIKI

MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA248

2-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D407-667-245

3-Remove sand and plugs

4-Scribe part # and batch # using vibrating stylus as per Dwg D407-667-245
Inside of Cuff(Donot engrave on outside of tube)

RD 08/02/06

6.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

RD 08/02/06

7.0

QC8

SECOND CHECK



Comment: SECOND CHECK

LF 08/02/06 (JH)

8.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

AWM

8-2-11

1-Polish entire outside surface of crosstube

9.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

RD 8-2-11

10.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

AWM 8-2-11

Chemical Conversion Coat as per QSI 005 4.1
Ensure no sand is in the tube before alodine.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

11.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Bend tube as per Dwg D407-667-245 using CNC bender program 407 Aft and Folio FT

EL 8-2-11 (P10)

12.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

13.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

Scrap

1-Drill pilot holes in tube using drill Jig DT8583 & DT8584 as per Dwg D407-667-245. Drill all (3) top holes.

2-Drill and Ream all holes in tube to finish size using drill Jig DT8583 & DT8584 as per Dwg D407-667-245. Check dimensions between holes on all four sides.

3-Flip tube and switch drilling Jigs from right to left, left to right. Locate Jigs off existing holes using "T" pins.

4-Drill pilot holes using drill Jig DT8583 & DT8584 as per Dwg D407-667-245. Drill only the top (2) holes.

5-Drill & ream the top (2) holes to finish size using drill Jig DT8583 & DT8584 as per Dwg D407-667-245

6-Drill Aft rivet holes using drill Jig DT8789 as per Dwg D407-667-245. Note: Aft side has 3x top holes.

7-Drill Fwd rivet holes using drill Jig DT8789 as per Dwg D407-667-245. Drill only the top (3) holes.

8-C'sink holes as per Dwg D407-667-245. Allow rivet to sit below surface to compensate for paint.

9-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D407-667-245

14.0

HAND FINISHING

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D407-667-205 PAR #: N/A Fault Category: Prod/Landing Gear NCR: Yes No DQA: D Date: 08/03/27
 QA: N/C Closed: A Date: 08/03/28

NCR: <u>37011</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
<u>08-03-24</u>	<u>11.0</u>	<u>Tube was out of tolerance</u> <u>(under bent, and un even on</u> <u>the height. tube was re bent</u> <u>then resulted in over bent.</u> <u>Reworking program run</u>	<u>[Signature]</u> <u>08/03/24</u>	<u>tube is swap.</u>	<u>SL</u> <u>8-3-26</u>	<u>[Signature]</u> <u>08/03/26</u>	<u>[Signature]</u> <u>08/03/24</u>	<u>[Signature]</u> <u>08/03/24</u>

NOTE: Date & initial all entries

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User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 407 HIGH AFT X-TUBE ASSEMBLY

Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

15.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

16.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

17.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: _____ LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

18.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

19.0

QC6

DIMENSIONAL CHECK



Comment: Inspect for damage & ensure results are as per Dwg D407-667-245

20.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

21.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

22.0

D2856400

Abrasion Strip



Comment: Qty.: 1.3524 f(s)/Unit Total : 1.3524 f(s)

Pick:

Qty Part number Description Batch

2 D2856-400(Cut to 7.73") Abrasion Strip

23.0

D2873043

Nut Plate Assembly



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2873-043 Nut Plate

24.0

D2873045

Nut Plate Assembly



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2873-045 Nut Plate

25.0

D28941

2.750 Support



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D2894-1 Support

26.0

D31901

Chafing Shield



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D3190-1 Chafing Shield

27.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0246 sf(s)/Unit Total : 0.0246 sf(s)

Rubber Cushion

2X .750" X 4.30"

Batch:

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 407 HIGH AFT X-TUBE ASSEMBLY

Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

28.0

MS20601AD4W8

RIVET



Comment: Qty.: 14.0000 Each(s)/Unit Total : 14.0000 Each(s)

Pick:

Qty Part number Description Batch

14 MS20601AD4W8 Rivet _____

29.0

MS2192022

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Pick:

Qty Part number Description Batch

4 MS21920-22 Clamp _____

30.0

MS2192025

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Clamp(per MIL-DTL-8783C)

Batch: _____

31.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install abrasion strips as per QSI 035 using DT8674. Install chafing shield as per Dwg D407-667-245. Note: (3) top holes should be facing up.

2-Install support with magnobond and install clamps as per Dwg D407-667-245. Torque clamps to 80-100 in lb

A/R Magnobond Batch: _____

3-Install nut plates as per Dwg D407-667-245. Touch-up rivet heads with Imron paint.

32.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

33.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 407 HIGH AFT X-TUBE ASSEMBLY

Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

34.0

AN534A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Bolt
Batch: _____

35.0

MS21042L5

Nut



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Nut
Batch: _____

36.0

AN510A

Bolt



Comment: Qty.: 10.0000 Each(s)/Unit Total : 10.0000 Each(s)
Pick:Packing Kit
Qty Part number Description Batch
10 AN5-10A Bolt _____

37.0

AN532A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Pick:Packing Kit
Qty Part number Description Batch
4 AN5-32A Bolt _____

38.0

AN960JD516

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)
Pick:Packing Kit
Qty Part number Description Batch
18 AN960JD516 Washer _____

39.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

40.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1
Identify and pack for shipping as per PPP D407-667-205
Location: _____
PPP Rev: _____

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 1/25/2008 10:57:21 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: 407 HIGH AFT X-TUBE ASSEMBLY

Job Number: 37011

Part Number: D407667205

Job Number:



Seq. #:

Machine Or Operation:

Description :

41.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



mf

08-03-27

✓

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order: 37011
Description: Crosstube Assembly		Part Number: D407-667-245
Inspection Dwg: D407-667-245 Rev: D		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

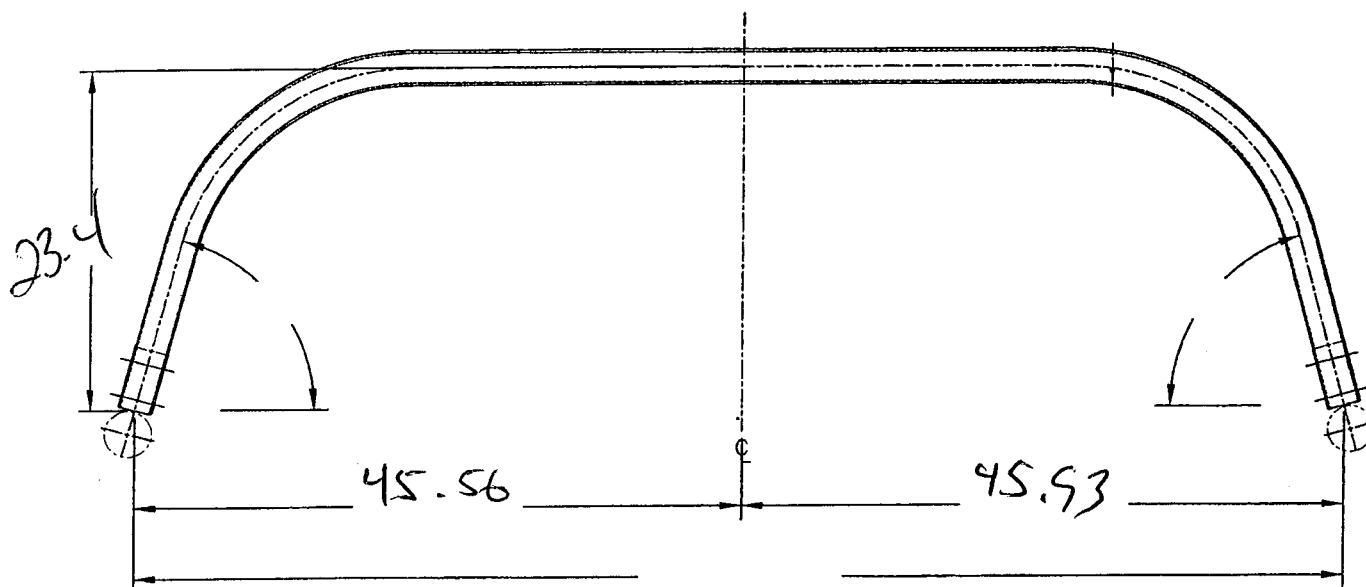
Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.490	+0.005/-0.000	2.491			
	1.832	+0.005/-0.000	1.832			
	1.838	+0.005/-0.000	1.840			
	1.892	+0.005/-0.000	1.896			
	2.052	+0.005/-0.000	2.056			
	2.206	+0.005/-0.000	2.206			
	2.521	+0.005/-0.000	2.525			
	2.633	+0.005/-0.000	2.636			
	4.10	+/-0.030	4.1			
	4.978	+/-0.030	4.98			
	2.040	+0.000/-0.010	2.033			
	0.125	+/-0.010	.13			
	R0.063	+/-0.010	.06			
	R0.500	+/-0.010	R.5			
SIDE B	2.490	+0.005/-0.000	2.492			
	1.832	+0.005/-0.000	1.832			
	1.838	+0.005/-0.000	1.841			
	1.892	+0.005/-0.000	1.896			
	2.052	+0.005/-0.000	2.055			
	2.206	+0.005/-0.000	2.206			
	2.521	+0.005/-0.000	2.525			
	2.633	+0.005/-0.000	2.633			
	4.10	+/-0.030	4.1			
	4.978	+/-0.030	4.98			
	2.040	+0.000/-0.010	2.033			
	0.125	+/-0.010	.13			
	R0.063	+/-0.010	.06			
	R0.500	+/-0.010	.5			
	112.91	+/-0.020	112.927			

Measured by: J.R.	Audited by: J.F.	Prototype Approval:	N/A
Date: 08/02/06	Date: 08/02/06	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-205)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	06.03.30	Tolerance revised for 4.978 dimension	KJ/JLM	
D	07.02.19	Dwg Rev updated	KJ/JLM	

DART AEROSPACE LTD		Work Order:	37011
Description: Crosstube High Aft (407)		Part Number:	D407-667-205
Inspection Dwg: D407-667-245 Rev: D		Page 1 of 1	

Required Dimension	Min	Max
Height	23.46	23.58
1/2 Span	45.86	45.98
Angle	54	56
Total Span	91.72	91.96



Comments

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	<i>[Signature]</i>

DART

DESIGN PH	DRAWN BY PH	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED H	APPROVED H	DRAWING NO. D407-667-245	REV. D SHEET 1 OF 3
DATE 07.02.07		TITLE CROSSTUBE ASS'Y (407 HIGH AFT) SCALE NTS	
A	02.05.13	NEW ISSUE	
B	03.05.21	ADD CHAFING SHIELD	
C	05.07.26	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
D	07.02.07	ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F-F, REMOVE -851 ABRASION STRIP, ADD MAGNOBOND 6398, ADD CUSHION	

RELEASED

07.02.04 H

Qty	Part Number	Description
X	D407-667-245	CROSSTUBE ASSEMBLY (407 HIGH AFT)
1	D6011-115	CROSSTUBE
2	D2856-400-773	ABRASION STRIP
2	D2873-043	NUT PLATE
2	D2873-045	NUT PLATE
1	D2894-1	SUPPORT
2	D3190-1	CHAFING SHIELD
2	D3595-075-430	RUBBER CUSHION
14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
4	MS21920-22	CLAMP
2	MS21920-25	CLAMP (OR MS21920-24)

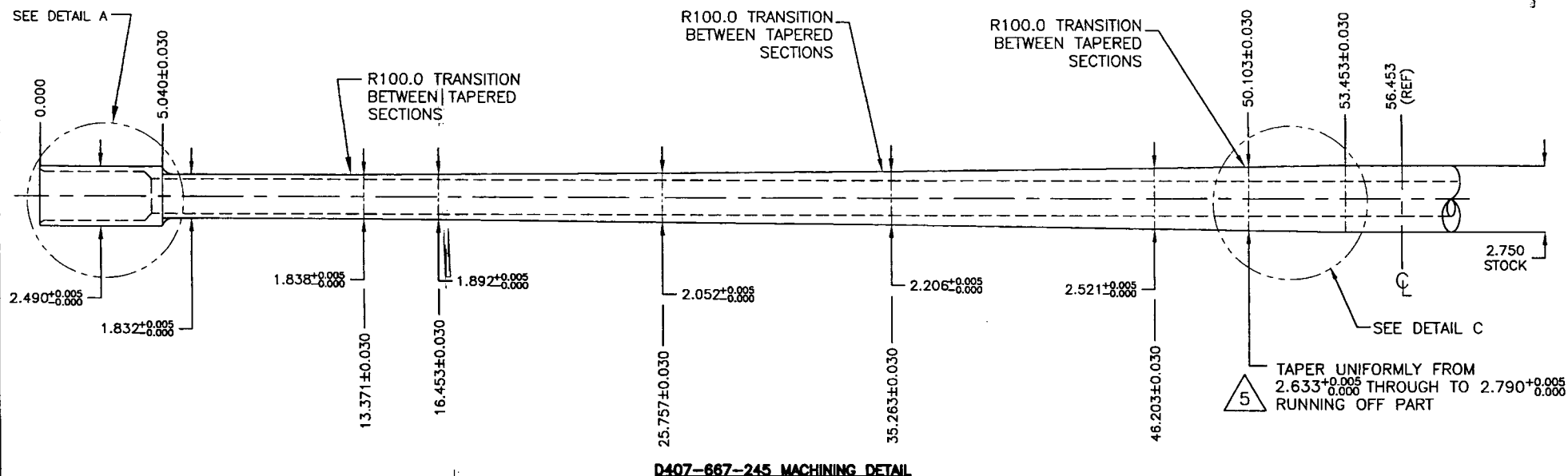
GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6011-115
FINISHED LENGTH = 112.91±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-400-773 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE, PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) INSTALL D2894-1 CENTER SUPPORT USING A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS WITH D3595-075-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.
- 14) INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS ON BOTTOM SIDE OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.

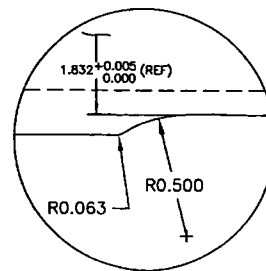
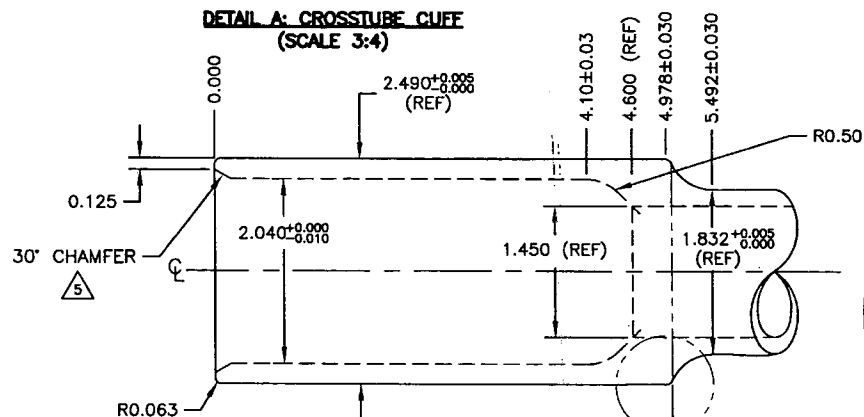
SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 37011

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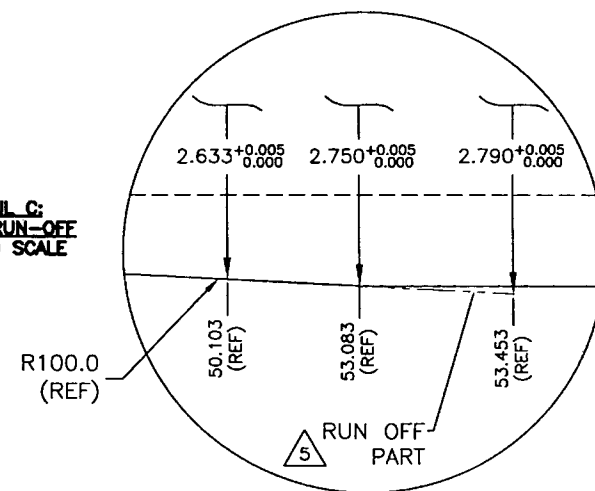


**DETAIL A: CROSSTUBE CUFF
(SCALE 3:4)**



**DETAIL B: CUFF
TRANSITION
SCALE 2:1**

**DETAIL C:
TAPER RUN-OFF
NOT TO SCALE**



RELEASED

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